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RATE OF DETERIORATION OF SUGAR CONTENT OF SOME P. O. J. SUGARCANE VARIETIES IN LOUISIANA

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INTRODUCTION

The present standard varieties of sugarcane grown in Louisiana are P. O. J.[1] 36, 213, and 234. Ever since the beginning of commercial culture of these varieties in 1925, data have been obtained on the rate of deterioration of the sugar content in standing cane, windrowed cane, and cane cut for the mill. Other disease-tolerating varieties were included in the experiments as the work progressed. A preliminary study of the problem was published in 1928.[2] The data there presented show that it is better to let the cane stand in the field until it can be cut for the mill rather than to windrow it. Cane windrowed early after a light frost deteriorated very rapidly. Cane windrowed late, after a hard freeze, kept almost as well as the standing cane.

During the harvest season of 1928–29 the experiments were continued, and the results, together with conclusions drawn from all the experiments to date, are here presented.

WEATHER CONDITIONS AND COLD RESISTANCE

The earliness of the spring, the growing conditions during the summer and fall, the temperature, and the distribution of rainfall are factors that determine the maturity of the cane. The practices of each harvest vary somewhat with the weather conditions for the year. This important fact should be borne in mind when any harvest operations are undertaken. Prior to and during harvest a study of the weather conditions for the year should be made and the harvest planned accordingly. The maturity of the cane is the most important factor influencing the keeping qualities of standing cane and determines to a large extent what cane may be windrowed advantageously.

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[1] P. O. J. denotes Proefstation Oost Java seedlings.

[2] Sartoris, G. B. DETERIORATION OF SUGAR CONTENT IN P. O. J. CANES. A PRELIMINARY STUDY OF THE RATE OF DETERIORATION OF STANDING, WINDROWED AND CUT CANES IN LOUISIANA. Facts About Sugar 23: 662-665. 1928.

The weather conditions for the year 1928 in Louisiana were not entirely favorable for the growth and maturity of sugarcane. The spring was late, wet, and cold. During the summer, however, weather conditions were very conducive to growth, so that the acre yields were good. A wet October was unfavorable to early maturity of the cane, but P. O. J. 234 showed a good sucrose content by the end of the month. November was dry and favorable to maturity of the cane. The rainfall for December was very nearly normal, whereas January (1929) was very wet, with about 300 per cent excess of rainfall.

At the United States Sugar Plant Field Station near Houma, La., the first freeze in the fall of 1928 occurred on November 20, and there was freezing weather also on November 21 and 22. The lowest temperature was 31° F. The cane was not appreciably injured, since only a few growing points of the cane on black land were killed. The first hard freeze occurred December 9, with a minimum of 25°. The cane was injured, the growing point, leaves, and lateral buds were killed, and the stalks were frozen and had a water-soaked appearance. The weather for the remainder of December was cool and very favorable for keeping the cane. There were freezing temperatures again on December 21, 22, 23, and 24, when the temperatures were 28°, 27°, 28°, and 32°, respectively. The weather during January was cold and wet. There were freezing temperatures on January 3, 12, 13, and 14, the lowest temperature, 29°, occurring on January 3. The low temperatures during December were very injurious because they occurred during periods of dry weather. The weather was favorable for harvesting during November and December, but in January operations were hampered by frequent rains.[3]

SOIL TYPES AND COLD RESISTANCE

The temperature during a freeze on the black lands farthest from the bayous is usually 1 or 2 degrees lower than the temperature on the "sandy" soil along the bayou, which is at a somewhat higher elevation. The temperature difference is probably due to the drainage of cold air to the lower land. If this were the only factor operating, the cane on the black land would suffer more during a freeze than the cane on the front land. But this is not always true. During the last harvest season, cane in bad condition from the effects of cold was evenly distributed over the different soil types. No doubt cane of the same variety and at the same stage of maturity would be more severely injured on the black soil. It often happens, however, that the cane on the black land is more mature than the cane of the same age on the sandy land. This tends to minimize the injury to cane on the black lands, so that the damage is not so great as would be expected from the difference in temperature.

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[3] For complete weather report see the following publication: U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU. CLIMATOLOGICAL DATA, LOUISIANA SECTION, 1928–29.

COMPARISON OF STANDING AND WINDROWED CANE

With the expansion of the plantings of sugarcane the problem of whether to let the cane stand or to windrow it has become of increasing importance. Previous experiments indicated that it was better to let the cane stand, though the time covered by the experiments was never extended beyond the 1st of January. The area of sugarcane has increased to such an extent that it is no longer possible to grind all the cane in so short a time. During the harvest season of 1928–29 grinding at some mills continued well toward the end of January, but the cane ground during the last two weeks had deteriorated to such an extent that it was almost worthless. It would be of value to the sugar industry of Louisiana if it were possible to keep cane in good condition for grinding during January.

EARLY WINDROWED CANE

Experiments of the last few years showed that cane windrowed after the first light frost deteriorated very rapidly. In 1928 cane was windrowed early at Houma, Laurel Grove, and Lafayette, La. The results at Houma are given in Table 1.

On December 4, 1928, P. O. J. 36, 213, and 234 were windrowed at the Houma station. This cane deteriorated very rapidly. At the end of a week the purities had fallen from 70 to about 50. P. O. J. 213 and P. O. J. 36 deteriorated more than P. O. J. 234. In various places throughout the State, where cane was windrowed early, there was a loss. However, P. O. J. 234 at P. R. Landry's plantation, near Lafayette, windrowed November 30, kept very well for over a month, and P. O. J. 213 at Laurel Grove plantation, windrowed November 30, was in good condition at the end of January, 1929, but the acidity was rather high, as shown in Table 2. The P. O. J. 213 at Laurel Grove was grown on black land. Its analyses and general appearance indicated that it was more nearly mature than most of the cane of the same variety grown on sandy or on mixed lands. The degree of maturity appears to be the important factor influencing its keeping quality. The temperature at that field may have been somewhat lower than the temperature on near-by sandy and mixed-land fields. The difference in temperature, however, could not have been very great, because the P. O. J. 213 used in this experiment did not appear to be damaged more than the cane on the other types of soil. In general, however, windrowing the P. O. J. cane after a light frost in the early part of the season is hazardous and is usually accompanied by heavy losses.

TABLE 1.—*Rate of deterioration of early windrowed compared with standing cane on "sandy" land at the United States Sugar Plant Field Station, Houma, La.*

Date analyzed	Variety	Analyses of standing cane				Analyses of cane windrowed Dec. 4, 1928			
		Brix	Sucrose	Purity	Acidity	Brix	Sucrose	Purity	Acidity
1928									
Dec. 4	P. O. J. 36	14.60	10.80	74.00	2.3	(1)	--------	--------	--------
Do	P. O. J. 213	15.20	11.80	77.63	1.7	(1)	--------	--------	--------
Do	P. O. J. 234	16.00	12.30	76.88	2.9	(1)	--------	--------	--------
Dec. 5	P. O. J. 36	14.80	11.05	74.66	--------	15.5	8.21	52.97	--------
Do	P. O. J. 213	16.30	13.08	80.25	--------	16.3	9.39	57.61	--------
Do	P. O. J. 234	15.50	12.15	78.39	--------	16.2	11.71	72.28	--------
Dec. 8	P. O. J. 36	14.50	10.53	72.62	--------	16.1	9.02	56.03	3.2
Do	P. O. J. 213	13.80	10.72	77.68	--------	16.8	8.77	52.20	2.6
Do	P. O. J. 234	15.90	12.53	78.74	--------	16.7	11.38	68.14	2.8

[1] Same as standing cane

LATE-WINDROWED CANE

Immediately after the freeze of December 9, 1928, at which time the temperature was low enough to kill the growing point and most of the green leaves, experiments with windrowed and standing cane were begun at Southdown, Mandalay, Crescent Farm, Raceland, and Laurel Grove plantations and at the United States Sugar Plant Field Station.

TABLE 2.—*Rate of deterioration of early windrowed plant cane on black land at Laurel Grove, La.*

Date analyzed	Variety	Analyses of cane windrowed Nov. 30, 1928				
		Brix	Sucrose	Purity	Acidity [1]	pH [2]
1929						
Jan. 12	P. O. J. 213	16.6	12.20	73.49	3.2	4.90
Jan. 21	do	17.0	12.64	74.35	3.8	
Jan. 29	do	16.3	12.68	77.79	3.4	4.49

[1] Acidity represented by number of cubic centimeters of N/10 NaOH per 10 cubic centimeters of juice.
[2] pH quinhydrone electrode.

The results from all of the experiments, except those at Raceland and at Crescent farm, which were destroyed about December 28, 1928, show that the windrowed cane kept better and longer than the standing cane. At Crescent farm and at Raceland, for the period December 9 to December 26, 1928, there was no appreciable difference between the keeping qualities of the standing and the windrowed cane. The data are given in Tables 3 and 4.

At Laurel Grove the standing P. O. J. 234 cane was in bad condition on January 8, 1929, and by January 15 the sucrose and purities of P. O. J. 36 and P. O. J. 213 were very low. P. O. J. 213 held up until January 15 and P. O. J. 36 until January 29, but after January 15 the acidities were very high. The windrowed cane showed no loss up to the time that the experiment was terminated, January 29, 1929. In this plot the sucrose content was not high at any time, and the analyses of the windrowed cane at the end of the experiment were higher than at the beginning. The results of the experiment are given in Table 5.

TABLE 3.—*Rate of deterioration of late windrowed compared with standing plant cane on "sandy" land at Raceland, La.*

Date analyzed	Variety	Analyses of standing cane				Date analyzed	Variety	Analyses of cane windrowed December 12, 1928			
		Brix	Sucrose	Purity	Acidity			Brix	Sucrose	Purity	Acidity
1928						1928					
Dec. 5	P. O. J. 213	15.7	13.04	83.06	2.0	Dec. 19	P. O. J. 213	16.2	13.20	81.48	----
Do	P. O. J. 234	14.9	11.61	76.32	2.2	Do	P. O. J. 234	17.5	14.52	82.97	----
Dec. 12	P. O. J. 213	14.8	12.75	86.15	2.0	Dec. 26	P. O. J. 213	16.1	13.15	81.68	2.3
Do	P. O. J. 234	15.9	13.84	87.05	2.0	Do	P. O. J. 234	17.2	12.29	71.45	3.1
Dec. 19	P. O. J. 213	15.4	12.66	82.21	----						
Do	P. O. J. 234	15.4	12.40	80.52	----						
Dec. 27	P. O. J. 213	15.9	13.10	82.09	2.7						
Do	P. O. J. 234	16.4	13.49	82.26	2.6						

TABLE 4.—*Rate of deterioration of late-windrowed compared with standing second-stubble cane on "sandy" land at Crescent farm, La.*

Date analyzed	Variety	Analyses of standing cane					Date analyzed	Variety	Analyses of cane windrowed Dec. 12, 1928				
		Brix	Sucrose	Purity	Acidity	pH			Brix	Sucrose	Purity	Acidity	pH
1928							1928						
Dec. 5	P. O. J. 36	16.0	12.90	80.63	1.9	----	Dec. 18	P. O. J. 36	13.9	9.86	70.94	3.9	4.70
Do	P. O. J. 213	16.6	14.10	84.94	1.7	----	Do	P. O. J. 213	16.5	14.20	86.10	2.4	5.00
Dec. 11	P. O. J. 36	14.5	11.24	77.54	----	----	Dec. 26	P. O. J. 36	13.2	10.03	75.99	4.1	4.32
Do	P. O. J. 213	15.5	12.59	77.22	----	----	Do	P. O. J. 213	16.9	14.41	85.27	2.5	4.85
Dec. 18	P. O. J. 36	14.8	11.40	77.03	2.4	----							
Do	P. O. J. 213	15.8	13.81	87.14	2.1	----							
Dec. 26	P. O. J. 36	14.2	10.59	74.58	2.9	4.91							
Do	P. O. J. 213	15.5	12.84	82.84	2.7	4.66							

TABLE 5.—*Rate of deterioration of late-windrowed compared with standing plant cane on "sandy" land at Laurel Grove, La.*

Date analyzed	Variety	Analyses of standing cane					Date analyzed	Variety	Analyses of cane windrowed Dec. 11, 1928				
		Brix	Sucrose	Purity	Acidity	pH			Brix	Sucrose	Purity	Acidity	pH
Dec. 5, 1928	P. O. J. 36	13.8	9.30	67.39	1.6		Dec. 18, 1928	P. O. J. 36	13.8	9.80	71.02		
Do	P. O. J. 213	14.9	11.50	77.18	1.6		Do	P. O. J. 213	14.3	10.74	75.11		
Do	P. O. J. 234	16.4	13.40	80.49	1.6		Do	P. O. J. 234	14.5	10.33	71.24		
Dec. 11, 1928	P. O. J. 36	13.4	9.07	67.69			Dec. 26, 1928	P. O. J. 36	13.7	9.50	69.35	4.3	5.41
Do	P. O. J. 213	14.7	11.24	76.74			Do	P. O. J. 213	15.4	12.32	80.00	2.3	5.33
Do	P. O. J. 234	15.1	11.66	77.22			Do	P. O. J. 234	14.6	10.63	72.81	3.7	5.08
Dec. 18, 1928	P. O. J. 36	14.6	10.52	72.06			Jan. 2, 1929	P. O. J. 36	13.6	9.30	68.39	4.6	
Do	P. O. J. 213	14.6	11.56	79.18			Do	P. O. J. 213	15.0	11.69	77.93	2.4	
Do	P. O. J. 234	14.7	11.52	78.37			Do	P. O. J. 234	14.8	10.49	70.88	3.8	
Dec. 26, 1928	P. O. J. 36	12.9	8.58	66.51	3.3	5.17	Jan. 15, 1929	P. O. J. 36	15.7	11.77	74.97	4.2	
Do	P. O. J. 213	14.0	10.60	75.72	3.5	4.90	Do	P. O. J. 213	14.9	11.63	78.06	2.8	
Do	P. O. J. 234	14.9	11.73	78.73	2.9	5.25	Do	P. O. J. 234	14.6	10.46	71.65	4.0	
Jan. 2, 1929	P. O. J. 36	12.8	8.26	64.53			Jan. 22, 1929	P. O. J. 36	15.5	11.76	75.87	3.0	4.74
Do	P. O. J. 213	13.7	9.80	71.54			Do	P. O. J. 213	16.3	13.53	80.54	2.4	4.49
Do	P. O. J. 234	14.4	9.82	68.20			Do	P. O. J. 234					
Jan. 8, 1929	P. O. J. 36	12.9	8.66	67.13		4.49	Jan. 29, 1929	P. O. J. 36	14.7	10.34	70.34	3.6	4.32
Do	P. O. J. 213	13.4	8.64	71.64		3.30							
Do	P. O. J. 234		(1)			3.47							
Jan. 15, 1929	P. O. J. 36	13.2	9.10	68.94	4.6								
Do	P. O. J. 213	12.5	7.19	57.52	7.0								
Do	P. O. J. 234		(1)		7.6								
Jan. 22, 1929	P. O. J. 36	12.5	7.73	61.84	4.0								
Do	P. O. J. 213		(1)		11.0								
Do	P. O. J. 234		(1)		10.4								
Jan. 29, 1929	P. O. J. 36	11.5	5.22	45.39	6.5	4.32							
Do	P. O. J. 213		(1)		11.8	4.06							

[1] Condition bad.

At Mandalay the windrowed cane, P. O. J. 36 and P. O. J. 213, was in good condition until January 29, 1929, but after January 21 there was a slight fall in sucrose and purity. The standing cane was in good condition until the end of December, 1928, when that part of the experiment was terminated because there was no more cane. For the time covered by the experiment there was no appreciable loss in sucrose or purity in the standing cane. The results are given in Table 6.

At Southdown plantation on December 14, 1928, P. O. J. 234 first stubble and P. O. J. 213 plant cane were treated in three ways for comparison; some was windrowed, some was cut and topped and placed in heap rows, and some was left standing. The topped P. O. J. 234 showed no deterioration December 31, and the windrowed P. O. J. 234 kept until January 7, 1929, without any loss in sucrose or purity. The standing P. O. J. 234 began to show a slight fall in sucrose and purity on January 14. It was still in good condition on January 21, but the fall in sucrose was about two points. The windrowed P. O. J. 213 showed the first slight fall in sucrose and purity on January 7, and by January 22 it had fallen about 10 points in purity. The standing P. O. J. 213 was in bad condition December 31. The analyses are given in Table 7.

TABLE 6.—*Rate of deterioration of late-windrowed compared with standing plant cane on "sandy" land at Mandalay, La.*

Date analyzed	Variety	Analyses of standing cane					Date analyzed	Variety	Analyses of cane windrowed Dec. 11, 1928				
		Brix	Sucrose	Purity	Acidity	pH			Brix	Sucrose	Purity	Acidity	pH
Dec. 10, 1928	P. O. J. 36	14.5	11.02	76.00	2.2	--------	Dec. 15, 1928	P. O. J. 36	16.4	13.08	79.76	2.2	5.67
Do	P. O. J. 213	15.9	13.61	85.54	2.0	--------	Do	P. O. J. 213	15.9	13.24	83.27	2.0	5.67
Dec. 19, 1928	P. O. J. 36	14.4	10.98	76.25	--------	--------	Dec. 19, 1928	P. O. J. 36	15.8	12.43	78.69	2.1	5.40
Do	P. O. J. 213	15.8	13.58	85.95	--------	--------	Do	P. O. J. 213	16.0	13.27	82.94	2.0	5.67
Dec. 28, 1928	P. O. J. 36	15.3	11.77	76.93	2.1	5.67	Dec. 27, 1928	P. O. J. 36	16.4	12.91	78.72	--------	5.67
Do	P. O. J. 213	16.0	13.63	85.19	2.3	5.41	Do	P. O. J. 213	15.9	13.22	83.15	--------	5.67
Jan. 2, 1929	P. O. J. 213	15.6	12.93	82.89	2.8	5.00	Jan. 2, 1929	P. O. J. 36	15.6	12.93	82.89	--------	--------
							Do	P. O. J. 213	15.9	12.73	80.06	--------	--------
							Jan. 14, 1929	P. O. J. 36	16.0	11.47	73.38	--------	5.00
							Do	P. O. J. 213	15.8	12.65	80.06	--------	5.67
							Jan. 21, 1929	P. O. J. 36	15.5	11.09	71.55	2.6	4.66
							Do	P. O. J. 213	16.3	13.24	81.21	2.2	4.92
							Jan. 22, 1929	P. O. J. 36	14.9	10.71	71.88	2.2	4.83
							Do	P. O. J. 213	15.8	12.52	79.24	2.0	5.00
							Jan. 29, 1929	P. O. J. 36	14.8	10.74	72.57	2.0	5.00
							Do	P. O. J. 213	15.2	11.88	78.16	1.8	4.83

TABLE 7.—*Rate of deterioration of P. O. J. 213 plant cane and P. O. J. 234 first-stubble cane on "sandy" land, standing, windrowed, and cut and topped at Southdown plantation, Houma, La.*

Date analyzed	Treatment and date	Analyses of P. O. J. 213					Date analyzed	Treatment	Analyses of P. O. J. 234 (windrowed and topped Dec. 14, 1928)				
		Brix	Sucrose	Purity	Acidity	pH			Brix	Sucrose	Purity	Acidity	pH
Dec. 12, 1928	Standing	12.3	10.15	82.52			Dec. 14, 1928	Standing	17.4	14.68	84.68	2.2	5.3
Do	Windrowed (Dec. 10)	14.1	11.28	80.00			Dec. 17, 1928	do	17.3	14.88	86.01	2.2	5.3
Do	Windrowed (Dec. 14)						Do	Windrowed	18.1	15.77	81.13	2.8	5.4
Do	Topped (Dec. 14)						Do	Topped	18.1	15.89	87.79	2.0	5.4
Dec. 14, 1928	Standing	13.6	9.95	73.16			Dec. 27, 1928	Standing	17.8	15.60	87.65		5.6
Do	Windrowed (Dec. 10)	15.2	11.61	76.38			Do	Windrowed	18.1	16.44	90.84		5.7
Do	Windrowed (Dec. 14)						Do	Topped	17.8	15.60	87.65		5.3
Do	Topped						Dec. 31, 1928	Standing	16.7	15.30	90.00		
Dec. 17, 1928	Standing	14.4	11.68	81.11	2.2	5.3	Do	Windrowed	18.1	16.90	93.38		
Do	Windrowed (Dec. 10)	15.2	11.50	79.66		5.2	Do	Topped	18.3	17.10	93.45		
Do	Windrowed (Dec. 14)	14.9	12.22	82.02		5.3	Jan. 7, 1929	Standing	17.3	15.27	88.27		6.1
Do	Topped	15.5	12.81	82.65	2.8	5.4	Do	Windrowed	17.6	15.31	86.99		6.4
Dec. 27, 1928	Standing	14.9	11.89	79.79		5.8	Do	Topped	17.2	14.75	85.76		6.4
Do	Windrowed (Dec. 10)	15.0	11.76	78.40		5.8	Jan. 14, 1929	Standing	16.4	12.93	78.84		5.9
Do	Windrowed (Dec. 14)						Jan. 21, 1929	do	16.5	13.66	82.79	3.6	4.1
Do	Topped	15.9	13.03	81.95		5.5							
Dec. 31, 1928	Standing		(1)										
Do	Windrowed (Dec. 10)	15.2	11.80	77.64									
Do	Windrowed (Dec. 14)	14.7	12.30	86.68									
Do	Topped	15.7	12.10	83.44									
Jan. 7, 1929	Windrowed (Dec. 10)	14.7	10.64	72.38		5.9							
Jan. 12, 1929	do	14.4	10.08	65.33									
Jan. 14, 1929	do	14.2	10.09	71.06									
Jan. 21, 1929	do	13.1	8.91	68.02	3.6	4.5							
Jan. 22, 1929	do	12.8	8.03	62.74	3.2	4.5							
Jan. 12, 1929	Windrowed (Jan. 3)		(1)										
Jan. 15, 1929	do	13.7	9.82	71.68		5.0							

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[1] Condition bad.

DETERIORATION TESTS

At the United States Sugar Plant Field Station, Houma, La., P.O.J. 213 in a date-of-planting test was used in a deterioration test. The data are given in Table 8. There were five different dates of planting at intervals of about two weeks, beginning with October 4 and extending to December 6, 1927. All the standing cane was in good condition on December 31 except the cane planted November 1. By January 14 all the standing cane was in bad condition except that planted October 17, but this showed a fall in sucrose of about 3 points and about 11 points in purity. All the windrowed cane was in good condition until January 14 except the cane planted October 17, but this was in good condition in the analysis the following week. On January 21 the windrowed cane was all in good condition except the cane planted October 4. All the canes, however, showed a fall in sucrose and purity.

IMPURITIES

The analyses of some of the canes after the freeze of December 9 showed very high apparent sucrose and purity, indicating that impurities were present which influenced the sucrose readings. The sucrose Clerget readings were always lower than the direct readings, which suggested that the impurity was a substance that was changed by the acid to form substances with a lower specific rotation. On precipitation with strong alcohol, a white substance was obtained that was soluble in dilute alkali, and the polarization and purity of the juice were lowered about 2 points and 10 points, respectively. It seems probable that the impurity was dextran. The sucrose Clerget with invertase was even lower than the acid Clerget. It was noticeable also in sugar houses grinding frozen cane that the purity of the crusher juice was much higher than the purity of the sirup.

CANE CUT FOR THE MILL

Results from experiments of the last few years show that cane cut for the mill early in the season deteriorates very rapidly. These experiments have been continued, and the data are given in the tables that follow. In Table 9 are given the results of experiments with cane cut for the mill October 17 and November 6, 1928. The varieties used in the experiment were P. O. J. 36, 36–M, 213, and 234. At the end of four days in the case of the cane cut on October 17 the purities had fallen 10 points, or more, and the cane had lost 7 to 15 per cent of its weight, owing to the evaporation of water.

On November 6 a rate-of-deterioration test with P. O. J. 36, 36–M, 213, and 234, first stubble, grown on black land, was begun. P. O. J. 36-M and P. O. J. 234 showed the first appreciable fall in sucrose and purity on November 14. There was a noticeable fall in sucrose and purity in all of the varieties by November 19; however, the loss of sucrose in P. O. J. 213 was only one point lower than the analysis of November 6. The loss of weight at the end of the experiment was from 5 to 10 per cent, and the percentage of reducing sugars had increased about 1 per cent.

TABLE 8.—*Rate of deterioration of P. O. J. 213 plant cane on mixed land at the United States Sugar Plant Field Station, Houma, La.*

Date planted	Date analyzed	Analyses of standing cane					Date planted	Date analyzed	Analyses of cane windrowed Dec. 10, 1928				
		Brix	Sucrose	Purity	Acidity	pH			Brix	Sucrose	Purity	Acidity	pH
1927							1927						
Oct. 4	Dec. 10, 1928	15.66	12.8	81.74	2.1		Oct. 4	Dec. 24, 1928	14.1	10.10	71.64		
Oct. 17	do	14.96	11.8	78.88	2.3		Oct. 17	do	14.9	11.22	75.30		
Nov. 1	do	14.86	11.5	77.39	2.2		Nov. 1	do	12.7	8.72	68.66		
Nov. 15	do	15.26	12.1	79.29	1.8		Nov. 15	do	14.9	10.83	72.69		
Dec. 6	do	13.96	10.2	71.78	1.9		Dec. 6	do	13.8	9.75	70.65		
Oct. 4	Dec. 17, 1928	15.10	12.18	80.66	2.2	5.364	Oct. 4	Dec. 31, 1928	16.0	12.96	81.00		
Oct. 17	do	12.1	7.97	65.87	2.2	5.415	Oct. 17	do	14.3	10.34	72.31		
Nov. 1	do	14.2	10.72	75.72	2.8	5.289	Nov. 1	do	15.2	11.79	77.57		
Nov. 15	do	14.5	11.26	77.66	2.0		Nov. 15	do	15.4	12.15	78.90		
Dec. 6	do	14.6	10.88	74.52	1.8		Dec. 6	do	15.4	11.89	77.79		
Oct. 4	Dec. 24, 1928	14.4	11.78	81.81			Oct. 4	Jan. 7, 1929	15.1	11.44	75.76		5.92
Oct. 17	do	13.6	10.37	76.25			Oct. 17	do	15.5	12.00	77.42		5.05
Nov. 1	do	12.9	9.52	73.80			Nov. 1	do	15.2	11.85	77.96		5.00
Nov. 15	do	13.9	10.82	77.84			Nov. 15	do	15.0	10.88	72.53		4.91
Dec. 6	do	14.2	11.08	78.03			Dec. 6	do	15.3	11.77	76.93		5.33
Oct. 4	Dec. 31, 1928	14.3	11.13	77.83			Oct. 4	Jan. 14, 1929	14.5	10.33	71.24		6.01
Oct. 17	do	14.5	10.07	69.45			Oct. 17	do	14.1	(1)	(1)		3.13
Nov. 1	do	(1)					Nov. 1	do	14.5	10.65	73.45		2.80
Nov. 15	do	13.3	9.96	78.89			Nov. 15	do	15.1	11.12	73.64		2.63
Dec. 6	do	13.4	9.64	71.94			Dec. 6	do	15.1	10.81	70.79		6.52
Oct. 4	Jan. 7, 1929	13.7	10.02	73.14		5.17	Oct. 4	Jan. 21, 1929	(1)				3.98
Oct. 17	do	14.0	10.52	75.14		5.67	Oct. 17	do	15.0	10.38	69.20	3.3	4.23
Nov. 1	do	13.4	(1)	(1)		5.17	Nov. 1	do	14.1	9.12	64.68	4.4	3.98
Nov. 15	do	12.9	8.78	68.06		5.84	Nov. 15	do	14.6	9.52	65.21	3.6	4.06
Dec. 6	do	12.9	9.25	71.71		5.33	Dec. 6	do	14.1	9.24	65.53	3.0	3.98
Oct. 4	Jan. 14, 1929	(1)				2.46							
Oct. 17	do	12.3	7.86	63.91		5.84							
Nov. 1	do	(1)				2.12							
Nov. 15	do	(1)				6.01							
Dec. 6	do	(1)				2.97							
Oct. 4	Jan. 21, 1929	(1)				3.98							
Oct. 17	do	(1)			8.8	3.98							
Nov. 1	do	12.8	7.22	56.41	6.0	3.98							
Nov. 15	do	(1)				4.15							
Dec. 6	do	(1)				4.06							

[1] Condition bad.

TABLE 9.—*Rate of deterioration of first-stubble cane cut for the mill on October 17 and November 6, 1928, at the United States Sugar Plant Field Station, Houma, La.*

CANE CUT FOR MILL OCTOBER 17

Date analyzed	Variety	Brix	Sucrose	Purity	Loss of water [1]	Reducing sugars
1928						
Oct. 17	P. O. J. 36	13.0	8.73	67.16		2.00
Do	P. O. J. 36-M	13.8	9.81	71.09		1.74
Do	P. O. J. 213	13.7	9.80	71.53		1.55
Do	P. O. J. 234	15.5	12.10	78.07		1.64
Oct. 19	P. O. J. 36	14.7	10.93	74.36	8.0	
Do	P. O. J. 36-M	13.1	8.83	67.41	5.2	
Do	P. O. J. 213	14.1	10.05	71.28	1.8	
Do	P. O. J. 234	15.1	11.93	79.34	3.8	
Oct. 20	P. O. J. 36	14.4	10.10	70.20	14.1	
Do	P. O. J. 36-M	13.8	9.81	71.09	4.3	
Do	P. O. J. 213	14.0	9.72	69.43	2.5	
Do	P. O. J. 234	15.0	11.05	73.67	11.8	
Oct. 22	P. O. J. 36	14.2	8.07	56.38	7.3	
Do	P. O. J. 36-M	14.3	8.23	57.55	11.1	
Do	P. O. J. 213	14.5	8.75	60.35	13.9	
Do	P. O. J. 234	15.8	9.80	62.03	15.5	
Oct. 23	P. O. J. 36	14.2	7.59	53.38	11.0	
Do	P. O. J. 36-M	14.2	9.17	64.50	14.5	
Do	P. O. J. 213	14.7	9.10	61.91	11.1	
Do	P. O. J. 234	16.1	10.26	63.92	13.8	
Oct. 24	P. O. J. 36	14.1	7.05	50.00	10.8	
Do	P. O. J. 36-M	14.6	8.14	55.76	12.9	
Do	P. O. J. 213	14.6	6.99	47.88	14.7	
Do	P. O. J. 234	16.4	9.48	57.81	14.7	
Oct. 25	P. O. J. 36	14.3	6.41	44.83	13.6	
Do	P. O. J. 36-M	14.7	7.08	48.75	12.9	
Do	P. O. J. 213	14.6	7.85	53.77	13.8	
Do	P. O. J. 234	15.9	8.56	55.84	16.1	
Oct. 26	P. O. J. 36	15.2	7.42	48.82	14.8	
Do	P. O. J. 36-M	15.0	7.44	49.60	15.6	
Do	P. O. J. 213	15.5	8.39	54.13	17.1	
Do	P. O. J. 234	16.3	8.32	51.04	21.4	
Oct. 29	P. O. J. 36	16.1	6.53	40.86	17.3	3.06
Do	P. O. J. 36-M	15.0	5.58	37.20	19.5	2.63
Do	P. O. J. 213	15.2	7.34	48.29	14.5	2.39
Do	P. O. J. 234	16.9	8.49	51.15	13.7	2.39

CANE CUT FOR MILL NOVEMBER 6

Date analyzed	Variety	Brix	Sucrose	Purity	Loss of water [1]	Reducing sugars
1928						
Nov. 6	P. O. J. 36	13.70	9.80	71.53		1.97
Do	P. O. J. 36-M	14.85	11.20	75.42		1.68
Do	P. O. J. 213	14.80	11.55	78.04		1.46
Do	P. O. J. 234	15.60	12.10	75.76		1.51
Nov. 8	P. O. J. 36	14.80	11.66	78.79	1.89	
Do	P. O. J. 36-M	14.20	10.40	72.23	2.13	
Do	P. O. J. 213	15.2	11.56	76.05	0	
Do	P. O. J. 234	15.8	11.46	72.28	2.08	
Nov. 9	P. O. J. 36	15.0	11.26	75.07	5.00	
Do	P. O. J. 36-M	14.7	10.75	73.13	4.84	
Do	P. O. J. 213	14.8	10.95	73.99	2.52	
Do	P. O. J. 234	15.7	11.44	72.87	2.23	
Nov. 10	P. O. J. 36	14.8	11.07	74.80	3.70	
Do	P. O. J. 36-M	14.2	10.35	72.89	5.04	
Do	P. O. J. 213	14.9	11.22	75.30	1.59	
Do	P. O. J. 234	15.8	11.76	74.43	0	
Nov. 12	P. O. J. 36	15.3	11.39	74.45	5.88	
Do	P. O. J. 36-M	15.5	11.10	71.62	7.32	
Do	P. O. J. 213	14.9	10.52	70.61	5.36	
Do	P. O. J. 234	16.6	12.72	76.87	6.66	
Nov. 14	P. O. J. 36	14.5	9.32	64.28	10.00	
Do	P. O. J. 36-M	14.7	10.18	69.25	6.25	
Do	P. O. J. 213	15.7	11.00	70.10	5.36	
Do	P. O. J. 234	16.3	11.40	69.94	2.86	
Nov. 17	P. O. J. 36	15.8	10.04	63.55	6.38	
Do	P. O. J. 36-M	15.6	9.82	62.94	11.34	
Do	P. O. J. 213	15.9	10.41	65.41	14.82	
Do	P. O. J. 234	17.1	10.00	58.80	12.00	
Nov. 19	P. O. J. 36	14.6	8.60	58.91	9.84	2.98
Do	P. O. J. 36-M	14.9	9.30	62.42	5.41	2.73
Do	P. O. J. 213	15.6	10.30	66.03	5.26	2.36
Do	P. O. J. 234	16.1	9.30	57.80	8.11	2.37

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[1] Percentage of weight of cane.

The following plant canes were used in a rate-of-deterioration experiment which was begun December 10, 1928: P. O. J. 36, 36–M, and 213; C. P. 71–B, 123, 177, and 807; Co. 281, and U. S. 1444. The data are given in Table 10. There was not enough standing cane to make weekly analyses. When the analyses were made on January 7 all of the standing canes were in bad condition except P. O. J. 36–M. The windrowed canes were good on January 7 except C. P. 123, P. O. J. 213, which was in bad condition as early as December 31, and Co. 281, which was in bad condition as early as December 24. The windrowed P. O. J. 36–M and C. P. 177 showed slight loss in sucrose or purity on January 14, and the windrowed C. P. 807 and U. S. 1444 were not actually in bad condition on January 14, but the sucrose and purities were very low.

The cane used in the two experiments summarized in Tables 9 and 10 was exposed to very severe conditions. The standing cane was in a narrow strip extending the full length of a field from which the surrounding cane had been harvested.

In another test which was begun December 10, 1928, at the Houma station the following varieties were used: P. O. J. 36, 36–M, 213, and 234, first stubble, on black land. The results are presented in Table 11. All of the standing cane was in bad condition on January 7, 1929, whereas the P. O. J. 213 was in bad condition on December 31. There was no loss in sucrose or purity in the windrowed cane on January 7, but the acidities were rather high. P. O. J. 213 and 234 showed the first slight loss in sucrose and purity on January 14, and by January 21 there was a very appreciable loss. There was no more cane of P. O. J. 36 and 36–M after January 14.

TABLE 10.—*Rate of deterioration of plant cane on mixed land at the United States Sugar Plant Field Station, Houma, La.*

Date analyzed	Variety	Analyses of standing cane				
		Brix	Sucrose	Purity	Acidity	pH
Dec. 10, 1928	P. O. J. 36	13.3	8.70	65.42		
Do	P. O. J. 36-M	15.2	11.49	75.59		
Do	P. O. J. 213	14.6	11.29	77.33		
Do	C. P. 71-B	15.2	11.14	73.29		
Do	C. P. 123	12.9	8.53	66.13		
Do	C. P. 177	15.4	11.20	72.73		
Do	C. P. 807	14.4	10.50	72.92		
Do	Co. 281	14.5	10.10	69.66		
Do	U. S. 1444	15.0	10.06	67.07		
Jan. 7, 1929	P. O. J. 36	12.5	(1)			5.00
Do	P. O. J. 36-M	14.6	11.07	75.82		5.08
Do	P. O. J. 213	12.2	(1)			5.58
Do	C. P. 71-B	13.0	(1)			4.86
Do	C. P. 123	18.0	(1)			5.25
Do	C. P. 177	11.7	(1)			5.00
Do	C. P. 807	12.5	(1)			4.74
Do	Co. 281	13.1	(1)			4.91
Do	U. S. 1444	12.8	(1)			4.66
Jan. 14, 1929	P. O. J. 36					
Do	P. O. J. 36-M					
Do	P. O. J. 213	(1)				3.13
Do	C. P. 71-B	(1)				2.72
Do	C. P. 123	(1)				6.01
Do	C. P. 177	(1)				1.10
Do	C. P. 807	(1)				1.61
Do	Co. 281	(1)				
Do	U. S. 1444	(1)				5.84

Date analyzed	Variety	Analyses of cane windrowed Dec. 10, 1928				
		Brix	Sucrose	Purity	Acidity	pH
Dec. 17, 1928	P. O. J. 36	13.9	9.86	70.94	2.8	5.27
Do	P. O. J. 36-M	15.5	11.86	76.52	2.1	5.43
Do	P. O. J. 213	14.8	11.41	77.03	2.6	
Do	C. P. 71-B	15.9	12.00	75.47	3.3	
Do	C. P. 123	12.3	8.21	66.75	3.6	5.33
Do	C. P. 177	15.2	10.99	72.30	3.2	5.33
Do	C. P. 807	14.2	10.07	70.92	3.2	5.17
Do	Co. 281	13.2	8.84	66.97	3.2	5.29
Do	U. S. 1444	15.4	10.95	71.11	2.5	5.33
Dec. 24, 1928	P. O. J. 36	13.6	9.14	67.21		
Do	P. O. J. 36-M	15.5	12.54	80.90		
Do	P. O. J. 213	13.2	9.15	69.32		
Do	C. P. 71-B	14.9	10.53	70.67		
Do	C. P. 123	12.4	8.45	68.15		
Do	C. P. 177	14.5	10.08	69.52		
Do	C. P. 807	14.1	10.15	71.99		
Do	Co. 281		(1)			
Do	U. S. 1444	14.7	10.24	69.66		
Dec. 31, 1928	P. O. J. 36	14.7	10.14	68.98		
Do	P. O. J. 36-M	15.2	11.39	73.76		
Do	P. O. J. 213	12.3	(1)			
Do	C. P. 71-B					
Do	C. P. 123	11.8	7.95	67.38		
Do	C. P. 177	14.9	10.58	71.01		
Do	C. P. 807	14.6	10.43	71.44		
Do	Co. 281	13.6	(1)			
Do	U. S. 1444	15.2	10.81	71.12		
Jan. 7, 1929	P. O. J. 36	13.1	8.28	63.21		6.01
Do	P. O. J. 36-M	15.3	10.20	66.67		6.35
Do	P. O. J. 213					
Do	C. P. 71-B					
Do	C. P. 123	11.4	(1)			5.33
Do	C. P. 177	14.8	10.53	71.15		5.92
Do	C. P. 807	13.9	9.77	70.29		6.09
Do	Co. 281					
Do	U. S. 1444	14.4	9.37	65.07		5.33
Jan. 14, 1929	P. O. J. 36					
Do	P. O. J. 36-M	15.2	10.80	70.60		3.13
Do	P. O. J. 213	11.0	(1)			6.01
Do	C. P. 71-B					
Do	C. P. 123	12.4	(1)			2.72
Do	C. P. 177	15.4	10.75	69.81		6.52
Do	C. P. 807	14.2	8.25	58.10		2.63
Do	Co. 281					
Do	U. S. 1444	14.1	7.84	55.60		6.52

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[1] Condition bad.

Table 11.—*Rate of deterioration of first-stubble cane on black land at the United States Sugar Plant Field Station, Houma, La.*

Date analyzed	Variety	Analyses of standing cane					Date analyzed	Variety	Analyses of cane windrowed December 10, 1928				
		Brix	Sucrose	Purity	Acidity	pH			Brix	Sucrose	Purity	Acidity	pH
Dec. 10, 1928	P. O. J. 36	15.5	12.61	81.36			Dec. 17, 1928	P. O. J. 36	15.6	12.64	81.03	2.0	5.36
Do	P. O. J. 36-M	16.2	13.32	82.22			Do	P. O. J. 36-M	15.5	12.47	80.45	2.4	5.29
Do	P. O. J. 213	15.8	13.10	82.63			Do	P. O. J. 213	15.8	12.92	81.77	2.6	5.33
Do	P. O. J. 234	17.1	14.30	83.38			Do	P. O. J. 234	15.9	13.01	81.83	2.8	5.10
Dec. 17, 1928	P. O. J. 36	13.8	10.58	76.67	2.0	5.35	Dec. 24, 1928	P. O. J. 36	15.9	12.86	80.88		
Do	P. O. J. 36-M	15.4	12.71	82.53	1.8	5.17	Do	P. O. J. 36-M	16.3	13.43	82.39		
Do	P. O. J. 213	14.3	12.77	89.30	2.6	5.20	Do	P. O. J. 213	15.6	12.74	81.67		
Do	P. O. J. 234	15.0	12.13	80.87	2.8	5.08	Do	P. O. J. 234	16.2	13.00	80.25		
Dec. 24, 1928	P. O. J. 36	13.9	10.65	76.62			Dec. 31, 1928	P. O. J. 36	15.7	12.48	79.49		
Do	P. O. J. 36-M	14.5	11.56	79.73			Do	P. O. J. 36-M	17.0	14.07	82.77		
Do	P. O. J. 213	14.4	11.68	81.11			Do	P. O. J. 213	16.1	12.88	80.00		
Do	P. O. J. 234	14.5	11.32	78.07			Do	P. O. J. 234	16.4	13.30	81.10		
Dec. 31, 1928	P. O. J. 36	14.1	9.93	70.43			Jan. 7, 1929	P. O. J. 36	15.7	12.43	79.17		5.41
Do	P. O. J. 36-M	14.5	10.14	69.93			Do	P. O. J. 36-M	15.7	12.50	79.62		3.80
Do	P. O. J. 213	13.7	(1)				Do	P. O. J. 213	15.5	12.00	77.42		4.83
Do	P. O. J. 234	15.0	11.69	77.93			Do	P. O. J. 234	16.7	13.56	81.20		4.83
Jan. 7, 1929	P. O. J. 36	13.9	(1)			4.74	Jan. 14, 1929	P. O. J. 36					
Do	P. O. J. 36-M	14.9	(1)			3.98	Do	P. O. J. 36-M					
Do	P. O. J. 213	14.6	(1)			4.40	Do	P. O. J. 213	15.4	11.44	74.29		3.30
Do	P. O. J. 234	14.8	(1)			4.32	Do	P. O. J. 234	16.1	11.40	70.81		4.01
Jan. 14, 1929	P. O. J. 36		(1)				Jan. 21, 1929	P. O. J. 36					
Do	P. O. J. 36-M		(1)				Do	P. O. J. 36-M					
Do	P. O. J. 213		(1)				Do	P. O. J. 213	14.3	9.71	67.90	4.1	3.81
Do	P. O. J. 234		(1)				Do	P. O. J. 234	15.3	9.81	64.15	6.4	3.81
Jan. 21, 1929	P. O. J. 36												
Do	P. O. J. 36-M												
Do	P. O. J. 213		(1)			3.98							
Do	P. O. J. 234		(1)		11.2	3.98							

[1] Condition bad.

In Table 12 are given the results of an experiment with P. O. J. 234 first-stubble cane begun on October 24, 1928. There was no loss in sucrose or purity at the end of seven days. On the eighth day, however, there was a fall in purity from 83.55 to 53.77, or about 30 points. The analyses two days later were not so low; the purity was 66.13 per cent, and the sucrose content, 11.11 per cent, was higher than the sucrose content on the first day. The deterioration probably was not as great as was indicated by the analysis on November 3. It appears to have been a variation due to sampling.

TABLE 12.—*Rate of deterioration of P. O. J. 234 first-stubble cane at Southdown plantation, Houma, La.*

Date analyzed	Brix	Sucrose	Purity
1928			
Oct. 24	14.4	10.87	75.49
Oct. 26	14.5	10.03	71.04
Nov. 2	16.9	14.12	83.55
Nov. 3	17.5	9.41	53.77
Nov. 5	16.8	11.11	66.13

In Table 13 are given the results of an experiment with P. O. J. 36, 213, and 234, plant cane, begun on November 28. There was no appreciable deterioration until December 8, when there was a fall in sucrose and purity, and an increase in reducing sugars. The acidities were about the same as at the beginning of the experiment.

TABLE 13.—*Rate of deterioration of plant cane cut for the mill November 28, 1928, at the United States Sugar Plant Field Station, Houma, La.*

Date analyzed	Variety	Brix	Sucrose	Purity	Reducing sugars	Acidity
1928						
Nov. 28	P. O. J. 36	14.60	10.80	74.00	1.37	2.3
Do	P. O. J. 213	15.20	11.80	77.63	1.06	1.7
Do	P. O. J. 234	16.00	12.30	76.88	1.02	2.9
Dec. 1	P. O. J. 36	14.90	10.81	72.55		
Do	P. O. J. 213	14.50	10.20	70.35		
Do	P. O. J. 234	16.50	12.54	76.00		
Dec. 4	P. O. J. 36	14.25	10.34	72.56		
Do	P. O. J. 213	14.95	11.41	76.32		
Do	P. O. J. 234	15.85	12.06	76.03		
Dec. 5	P. O. J. 36	15.30	10.49	68.56		
Do	P. O. J. 213	15.60	10.78	69.10		
Do	P. O. J. 234	16.80	12.06	71.79		
Dec. 8	P. O. J. 36	14.70	9.90	67.35	1.84	2.4
Do	P. O. J. 213	15.10	9.60	63.51	2.66	2.0
Do	P. O. J. 234	15.80	10.50	66.46	1.96	3.2

BURNED CANE

The burning of cane must be looked upon as an economical method of harvesting, since it will decrease the labor costs 25 cents or more a ton. Wherever labor is scarce and the cane can be hauled to the mill within two or three days after cutting, burning may be used to great advantage. There are two methods of burning cane; in one the cane is burned while standing in the field, and in the other the cane is cut and topped, and burned after having been placed in the heap rows. The cane is damaged less when it is burned standing in the field. The amount of heat generated is small, and the fire passes very quickly, so that the temperature of the cane is raised but a few degrees. When the cane is burned in the heap row the fire is more concentrated and continues to burn for a longer time. The cane in the heap row becomes very warm and the interior of the stalk is discolored. Where the latter method is used it is advisable to burn immediately ahead of the loaders. The cane should be spread out in an even layer on the heap row, and then, after burning, heaped up for the loaders. All cane burned in heap rows should be ground within 48 hours.

The rate of deterioration of cane burned while standing in the field is about the same as in unburned cane, and will vary with the maturity of the cane and the weather conditions. While the loss in sucrose and the fall in purity, for a given time, are about the same in burned and unburned cane, the end products of deterioration may differ. In the unburned cane the loss of sucrose results from spontaneous inversion, the cane remaining sweet; while in the burned cane there may be also some fermentation, and the cane will have a bad flavor. While the losses in the manufacture of sugar from unburned and burned cane may be the same, in the manufacture of sirup, however, there may be no loss from the former, while the latter may be a total loss because the color and flavor of the sirup will be poor.

The results of the first experiment on burned cane, begun on November 12, are given in Table 14. The varieties of cane used were P. O. J. 36, 213, 234, and Louisiana Striped. In the case of the burned cane left standing, there was a change in sucrose and purity of the P. O. J. varieties on November 20, but the Louisiana Striped showed no deterioration. On November 22, when the experiment was terminated, there was no extensive change in the sucrose content of the burned cane which had been cut for the mill November 12. There was a fall in purity, and the percentage of reducing sugars was much larger. The acidities were between 1.9 and 2.6, which is about normal for fresh cane. The loss of weight from evaporation of water was about 5 per cent.

TABLE 14.—*Rate of deterioration of standing cane burned November 12, 1928, and of burned cane cut for the mill November 12, 1928, at Southdown plantation, Houma, La.*

Date analyzed	Variety	Analyses of burned cane cut for the mill						Date analyzed	Variety	Analyses of burned cane left standing		
		Brix	Sucrose	Purity	Reducing sugars	Acidity	Loss of water [1]			Brix	Sucrose	Purity
1928								1928				
Nov. 12	P. O. J. 36	15.4	11.98	77.79	1.46			Nov. 12	P. O. J. 36	15.4	11.98	77.79
Do	P. O. J. 213	15.1	12.10	80.14	1.02			Do	P. O. J. 213	15.1	12.10	80.14
Do	P. O. J. 234	15.9	13.26	83.40	1.07			Do	P. O. J. 234	15.9	13.26	83.40
Do	Louisiana Striped	13.1	8.46	64.50	1.01			Do	Louisiana Striped	13.1	8.46	64.50
Nov. 14	P. O. J. 36	16.1	12.78	79.38			3.03	Nov. 15	P. O. J. 36	14.5	10.78	73.80
Do	P. O. J. 213	15.8	12.54	79.37			8.00	Do	P. O. J. 213	14.6	11.56	79.18
Do	P. O. J. 234	16.1	12.88	80.00			1.79	Do	P. O. J. 234	14.6	10.27	70.34
Do	Louisiana Striped	15.2	11.61	76.38			2.62	Do	Louisiana Striped			
Nov. 16	P. O. J. 36	15.6	11.29	72.39			6.98	Nov. 20	P. O. J. 36	14.7	10.62	68.18
Do	P. O. J. 213	16.6	12.64	76.15			0	Do	P. O. J. 213	14.9	11.36	76.24
Do	P. O. J. 234	15.8	13.18	78.45			6.67	Do	P. O. J. 234	15.1	11.48	76.03
Do	Louisiana Striped	16.6	11.98	76.80			6.66	Do	Louisiana Striped	14.1	10.50	74.46
Nov. 17	P. O. J. 36	16.6	11.17	61.27			7.61					
Do	P. O. J. 213	17.2	13.76	80.00			6.66					
Do	P. O. J. 234	16.6	13.11	78.98			7.14					
Do	Louisiana Striped											
Nov. 20	P. O. J. 36	14.6	12.03	82.39			2.47					
Do	P. O. J. 213	16.9	13.16	77.87			[2] 16.66					
Do	P. O. J. 234	16.9	12.43	73.55			5.17					
Nov. 22	P. O. J. 36	16.0	10.91	68.36	2.25	1.9						
Do	P. O. J. 213	17.1	12.60	73.85	2.16	2.2						
Do	P. O. J. 234	16.6	12.50	75.48	1.69	2.6						
Do	Louisiana Striped	15.5	11.00	73.37	1.64	1.2						

[1] Percentage on weight of cane.

[2] The reason for this exceptionally high figure is not known.

In Table 15 are given the results of an experiment with burned P. O. J. 36 and 213 plant cane begun on December 27, 1928. There was no deterioration at the end of eight days. The analyses were low from the beginning.

TABLE 15.—*Rate of deterioration of plant cane burned and cut for the mill, December 27, 1928, at Southdown plantation, Houma, La.*

Date analyzed	Variety	Brix	Sucrose	Purity
Dec. 27, 1928	P. O. J. 36	12.5	7.80	62.40
Do	P. O. J. 213	12.2	8.73	71.56
Dec. 29, 1928	P. O. J. 36	12.8	8.30	62.40
Do	P. O. J. 213	13.1	9.70	71.56
Jan. 2, 1929	P. O. J. 36	13.0	7.76	60.16
Do	P. O. J. 213	12.8	9.06	70.78
Jan. 3, 1929	P. O. J. 36	13.2	8.46	64.09
Do	P. O. J. 213	13.0	8.93	68.69
Jan. 4, 1929	P. O. J. 36	13.3	8.28	62.26
Do	P. O. J. 213	12.8	8.78	68.59

The rate of deterioration in P. O. J. 234, first stubble, burned and unburned, was not the same. The results from an experiment begun January 18, 1929, with cane that had been frozen are given in Table 16. There was no deterioration in the unburned cane for the first four days, while in the burned cane there was a continuous fall in sucrose and purity. By January 25 the unburned cane was in bad condition, and the analyses of the burned cane were very low. The acidities were very high throughout the experiment.

The entire series of experiments show that during the early part of the season, from October 17 to about November 15, when the cane is immature, cane cut for the mill deteriorates very rapidly; therefore the cane should be ground as soon as possible. From about the middle of November, or after the cane has been frosted, until the end of December the rate of deterioration is much slower. As much as six or seven days may be allowed from the time of cutting to the time of milling. When the cane has been frozen and left standing in the field for more than four weeks, the cane cut for the mill deteriorates in about four days.

TABLE 16.—*Rate of deterioration of P. O. J. 234 cane cut for the mill January 18, 1929, unburned and burned (first stubble), at Southdown plantation, Houma, La.*

Date analyzed	Analyses of unburned cane					Analyses of burned cane				
	Brix	Sucrose	Purity	pH	Acidity	Brix	Sucrose	Purity	pH	Acidity
1929										
Jan. 18	16.57	13.89	88.83	4.83	2.6	16.57	13.89	88.83	4.83	2.6
Jan. 19	16.5	12.50	75.76	3.98	5.3	16.6	13.86	83.49	4.80	2.5
Jan. 21	16.5	13.66	82.79	4.06	3.6	16.5	13.04	79.03	4.87	3.0
Jan. 22	16.8	13.91	82.80	4.32	3.0	16.7	12.30	73.66	4.32	3.6
Jan. 25	(1)	--------	--------	4.40	8.6	15.4	8.80	57.14	3.98	6.2
Jan. 29	--------	--------	--------	--------	--------	(1)	--------	--------	3.98	8.0

[1] Condition bad.

LOSS IN WEIGHT DUE TO EVAPORATION

After the cane is cut there is a continuous loss of weight, due to the evaporation of water from its surface. All other factors remaining constant, the rate of loss is dependent upon the relation between surface area and volume of the stalk. A cane of small diameter, since it has a large surface area per unit volume, will lose a larger percentage by weight than a cane with a large diameter.

Stalks with large and small diameters of each of the varieties P. O. J. 36, 213, 234, 2714, and Louisiana Purple were cut and stripped in accordance with the usual harvest practice. The ends were cut so as to be as nearly circular as possible. The diameter of each internode was measured with a caliper, the measurements were averaged to give the mean diameter of the stalk, and the total surface area and volume of the stalk were calculated. Dividing the volume by the total surface area gives unities of volume for each unit of surface. A stalk with a mean diameter of 1.9 centimeters (about three-fourths of an inch), will have 0.473 of a unit of volume for each unit of surface, a stalk with a mean diameter of 2.47 centimeters (1 inch) will have 0.614, and a stalk with a mean diameter 4.34 centimeters (1¾ inches), will have 1.072 unities of volume for each unit of surface. As the diameter of the stalk increases the surface area for unit volume decreases. The canes were placed across the rows in the field in the same manner as cane cut for the mill. The stalks of cane were weighed daily. The results of the experiment are given in Table 17.

TABLE 17.—*Percentage of loss in weight by stalks of different diameters*

Variety	Diameter	$\frac{V}{S}$[1]	Total loss in 31 days	Average daily loss
	Centimeters		*Per cent*	*Per cent*
P. O. J. 2714	4. 343	1. 0720	[2] 19. 18	0. 31
P. O. J. 213	2. 471	. 6140	29. 19	. 94
Do	1. 908	. 4743	29. 34	. 95
P. O. J. 234	2. 380	. 5913	29. 79	. 96
Do	1. 906	. 4749	32. 27	1. 04
P. O. J. 36	2. 382	. 5918	36. 04	1. 17
Do	1. 918	. 4750	37. 61	1. 21
Louisiana Purple	3. 004	. 7438	27. 09	. 87
Do	2. 429	. 6025	30. 24	. 98

[1] Volume of the stalk divided by the surface area.
[2] 62 days.

In most cases the data show that the small stalks lose a larger percentage by weight than the large stalks of the same variety. The large and small stalk of P. O. J. 213 lost at about the same rate. The maturity of the stalks may be an important factor, and it is not possible to select stalks of the same age unless the stalks are tagged early in the growing season.

The results of experiments made at the United States Sugar Plant Field Station, Houma, La., but not included in this circular, show that if a stalk of cane is cut into thirds the loss of weight is largest from the top section, next from the middle section, and least from the bottom section. In some cases, especially in P. O. J. 213 and 234, the mean diameter of the bottom section is less than that of the middle section, and in such cases there is a greater loss of water from the bottom section than from the middle section.

In an experiment made to determine the loss of water from the cut ends, the root rings at the nodes, and the epidermis, the following method was used: Cuttings of about the same diameter, three nodes long, were selected from the middle portion of stalks of P. O. J. 213. The cuttings were divided into four groups. The cut ends of the first group were coated with paraffin; in the second group the cut ends and the root rings were covered; and in the third group the entire surface of the cuttings was coated. The fourth group, the check, was untreated. At the end of 28 days the check had lost 32.53 per cent. The pieces with the ends paraffined had lost 15.02 per cent, the pieces with cut ends and root rings paraffined had lost 11.19 per cent, and the loss of weight from the pieces entirely coated was 1.82 per cent. The results show that about half of the water is lost through the cut ends and that there is a considerable loss through the root rings. The rest of the surface of the stalk which is covered by the silicious epidermis loses comparatively little water. The cuttings covered with paraffin lost very little water during the greater part of the experiment. Most of this loss, which occurred during the last three or four days, resulted from the rootlets and some of the eyes germinating and growing through the paraffin coating.

When the cut ends of an entire stalk of cane are paraffined the loss of water is about the same as from an unparaffined stalk. While the loss of water is greatest from the cut surface and the first node, the area of the cut surface and first node of an entire stalk is small in proportion to the total surface area. In the case of a short cutting it is proportionately much larger.

The results of experiments with bundles of cane weighing 70 to 100 pounds did not check with the results obtained from single stalks. The daily loss in weight of the bundles was 1.5 to 2 per cent. There is no doubt that the experiments with the single stalks are more accurate. Large bundles of cane have to be tied securely, and if the cane is crooked, which is nearly always the case in Louisiana, some of the stalks are broken. Also, there is always the possibility of the brittle tops breaking off and becoming lost during handling. As compared to the loss of weight from bundles of cane, the average daily loss of 20 single stalks was 1.08 per cent. Since the cane was in the field for a month under the same conditions as cane cut for the mill, the average daily loss of 1.08 per cent is probably very close to the actual losses sustained when cane is cut for the mill and left in heap rows in the field. Perhaps cane loaded in large standard railway cars and cane in large heaps at the mill does not lose so much.

The loss of weight during a rain or during cloudy weather is less than the daily average, but for the first or second day after a rain the loss may be two or three times greater than the average.

The loss of weight due to evaporation may be of no importance to the manufacturer who buys cane or to the planter who sells it on a sucrose basis, but it is of interest to both when cane is sold by the ton at a dollar to the cent on the quotations of raw sugar.

STUBBLE DETERIORATION

When the varieties P. O. J. 213 and P. O. J. 36 are cut too early in the fall the stubble suffers, and the stand the following spring may be poor, but when P. O. J. 234 is cut too early the stubble usually fails to produce a stand of cane the following spring. This deterioration of early cut stubble is due to several factors; some are pathological, brought about by the activity of fungi and bacteria on the roots and rhizomes, and some are physiological, dependent upon the behavior of the sugarcane plant. It is probable that the physiological factors are more important. In the spring the eyes of the stubble are dependent upon the food reserve in the rhizomes for germination and growth until they can establish themselves as independent plants. It is apparent, then, that the amount of food reserve (sugars) in the rhizomes, or underground portion of the stalk, is an important factor. Table 18 gives some analyses of cane and rhizomes. Five or six stools were used for each analysis. The analyses of the cane and its rhizomes were made on the same day the cane was cut.

TABLE 18.—*Sugar content of cane and rhizomes as analyzed on the day cut*

Date of cutting	Variety	Brix	Sucrose	Purity	Reducing sugars	Portion of plant
1928						
Nov. 12	P. O. J. 213	14.0	10.10	72.13	0.360	Cane.
Do	do	11.1	7.40	66.66	.190	Rhizomes.
Dec. 7	do	16.2	12.90	79.63	.905	Cane.
Do	do	15.5	12.80	82.58	.406	Rhizomes.
Do	P. O. J. 234	16.6	13.10	78.92	.531	Cane.
Do	do	15.5	12.80	82.58	.406	Rhizomes.
Dec. 29	do	16.6	14.35	86.45	.323	Cane.
Do	do	14.6	11.75	80.84	.225	Rhizomes.

The figures show that at the time of cutting the rhizomes have about the same sugar content as the cane and that there is a large amount of reserve food. If the sugars would remain in the stubbles until spring there would be ample food for the growth and establishment of the young plants. Under normal conditions in Louisiana, however, the eyes of the stubble germinate soon after the cane is cut, and the earlier the cane is cut the greater the germination and growth of the new shoots. For their early growth these plants use the food stored in the rhizomes, and they do not become independent until they have developed their own root systems. During the winter these young plants are killed by the frost, usually before they have developed an extensive root system or formed lateral buds. In the spring when growth is resumed the food supply of the stubble has been nearly exhausted. The remaining eyes, usually at the base of the rhizomes, which did not germinate in the fall, may not have sufficient food for early growth until they can establish themselves as independent plants. Table 19 gives analyses, made from time to time during the winter, of stubbles cut at different dates.

TABLE 19.—*Analyses of rhizomes of stubbles cut and analyzed at various intervals*

Date of cutting of cane	Date of analysis of rhizomes	Variety	Brix	Sucrose	Purity	Reducing sugars	Acidity	pH
						Per cent		
Aug. 27, 1928	Nov. 8, 1928	P. O. J. 234	6.10	1.86	30.50	0.411		
Do	Jan. 25, 1929	do	4.80	1.50	31.25	.460	1.6	5.17
Do	Feb. 20, 1929	do	4.50	1.90	42.23	.308	2.1	
Do	Feb. 14, 1929	do	.70	.20			1.5	
Do	Nov. 12, 1928	P. O. J. 213	6.50	2.30	35.38	1.040		
Do	Jan. 25, 1929	do	6.40	3.00	46.88	.527	2.0	4.83
Do	Feb. 20, 1929	do	3.40	1.00	29.42	.478	1.6	
Oct. 15, 1928	Dec. 29, 1928	P. O. J. 234	9.35	5.75	61.50	.478		5.50
Do	Jan. 25, 1929	do	6.50	3.40	52.31	.684	1.4	5.08
Do	Feb. 4, 1929	do	4.70	1.60	34.05	.595	1.2	5.00
Do	Jan. 25, 1929	P. O. J. 213	7.10	4.05	57.05	.713	2.2	4.66

TABLE 19.—*Analyses of rhizomes of stubbles cut and analyzed at various intervals*—Continued

Date of cutting of cane	Date of analysis of rhizomes	Variety	Brix	Sucrose	Purity	Reducing sugars	Acidity	pH
						Per cent		
Nov. 1, 1928	Jan. 25, 1929	P. O. J. 36	5.70	2.10	36.85	0.684	2.0	5.08
Do	Jan. 30, 1929	do	4.60	1.75	38.04	.666	2.2	5.33
Do	do	P. O. J. 213	6.00	3.00	50.00	.684	1.7	5.00
Nov. 10, 1928	do	P. O. J. 234	7.00	2.70	38.58	.707	1.0	5.17
Do	Feb. 4, 1929	P. O. J. 36	4.60	1.75	38.04	.666	2.2	5.33
Do	Feb. 14, 1929	do		1.10		.332	1.6	
Do	Feb. 20, 1929	do	5.70	3.00	52.64	.652	1.5	
Do	Feb. 13, 1929	P. O. J. 234	6.10	1.80	29.51	.612	2.3	
Do	Feb. 14, 1929	P. O. J. 213		1.10		.822	1.5	
Do	do	P. O. J. 234		.70		.428	1.8	
Nov. 20, 1928	Jan. 30, 1929	P. O. J. 36	5.50	2.80	50.91	.750	1.5	4.83
Do	do	P. O. J. 213	5.70	2.30	40.36	.778	1.2	5.00
Do	do	P. O. J. 234	5.90	1.40	23.73	.499	1.7	5.17
Do	do	Louisiana Striped.	7.90	3.40	43.04	.803	2.4	5.17
Do	Feb. 4, 1929	P. O. J. 213	4.30	1.65	38.37	.588	1.6	5.17
Do	do	P. O. J. 234	6.00	3.30	34.05	.595	2.0	5.00
Dec. 1, 1928	Feb. 20, 1929	P. O. J. 36	5.70	3.00	52.64	.652	1.2	
Do	Jan. 1, 1929	P. O. J. 213	6.40	3.00	46.88	.527	2.6	4.83
Dec. 10, 1928	Feb. 13, 1929	do	9.20	5.50	59.79	.773	2.6	
Jan. 4, 1929	do	do	10.10	7.10	70.30	.473	2.5	
Jan. 10, 1929	do	P. O. J. 234	9.40	6.30	67.30	.666	2.8	
Jan. 19, 1929	do	do	9.90	7.00	70.71	.456	2.0	5.00
Do	do	do	11.10	5.55	50.00	.452	1.8	5.17
Do	do	P. O. J. 213	10.50	6.90	65.72	.462	3.0	
Do	do	P. O. J. 234	14.00	7.00	50.00	.527	2.1	
Do	do	do	10.00	7.20	72.00	.547	2.0	
Do	Feb. 20, 1929	do	9.20	6.50	70.66	.556	1.8	
Do	do	P. O. J. 213	8.20	5.50	67.08	.599	2.4	

The analyses made during the winter show that the sucrose content of the rhizomes from which the cane was cut early becomes very low. Even when the cane was cut as late as November 20 the sucrose content two months later varied from 1.40 to 3.40 per cent. When the cane was cut December 1 or later the sucrose content of the rhizomes at subsequent dates varied from 3 to 7.2 per cent. The percentage of reducing sugars averaged about 0.5 regardless of the dates on which the cane was cut. The acidity of the rhizomes is rather constant throughout the winter and is very nearly that of cane in good condition. The cane cut late in the season was frozen and very acid, but apparently there was no diffusion of the acid juices into the rhizomes.

While the sucrose content of the rhizomes of cane harvested on November 10 and later is low, the deterioration of the stubbles will not be so great as from early-cut cane, because the young plants that are urilizing the reserve food will not grow enough to be destroyed by frost during the winter. The leaves emerge from the ground, but the growing point seldom does. These plants will continue growth in the spring. The stubble will then fail only in case of a late spring frost.

The stubble of early cut P. O. J. 234 is spongy and dry. Seven or eight stools of P. O. J. 234 were needed in order to obtain 500 cubic centimeters of juice, while four stools of P. O. J. 213 or P. O. J. 36 gave about 1,000 cubic centimeters of juice.

The rhizomes of P. O. J. 234 are about 3 to 4 inches long, while those of P. O. J. 213 and P. O. J. 36 are longer, usually about 4 to 5 inches. There are on an average about three eyes on the upper portion of the rhizomes, and there are several eyes on the slender, woody lower portion, but these eyes do not germinate readily. Therefore the stand of cane in the spring will depend upon the few ungerminated eyes on the upper portion of the rhizome and on the fall plants that were not killed by the frost. It is seldom that the fall plants grow so large as to form lateral eyes mature enough to germinate.

STUBBLE SHAVING

The considerations given above indicate that little benefit can be derived from shaving stubbles. The rhizomes are very short, and shaving will destroy one or even two eyes. It also allows fuing to enter a fresh area. All the stubbles above ground are usually invaded by fungi, but their growth is nearly always checked by the first node. Shaving, especially when done early, allows the fungi to enter another internode. It is not possible to shave late, because the eyes germinate during the winter and are usually up to a stand in February. When the cane is shaved the plants are disturbed, and unless there is a rain immediately following the operation the plants may be permanently injured. It is difficult to shave at a uniform depth, and many plants are shaved too deep, and many are uprooted. The benefits derived from a slight lowering of the row and the destruction of weeds appear to be more than offset by the injury to the cane.

EFFECT OF FROZEN CANE ON STUBBLE

The effect of frozen cane on the stubble is not so serious in Louisiana as in Georgia. In Georgia frozen cane must be cut within a few days after the freeze; otherwise the stubbles are injured to such an extent that there will be little or no germination in the spring. This is not the case in Louisiana. Frozen cane was left standing for about five weeks, and the stubbles were not affected. The cane was in bad condition and was discolored, the sucrose content was low, and the acidity was high. The rhizomes, however, appeared normal in color, the sucrose content was good, and acidity was normal. (See the analysis in Table 19 of cane cut January 19, 1929.) The difference may be due to the characters of the soils. In Louisiana the soils are compact, fine loams, and frost does not penetrate more than 1 inch even during the coldest weather, while the soils in Georgia are sandy and porous, and the frost penetrates deeper. The climate is somewhat milder in Louisiana, and growth takes place during most of the winter, while in Georgia the cane is dormant until spring.

THE RÔLE OF P. O. J. 234

P. O. J. 234 appears to be less suitable for culture under Louisiana conditions than the other P. O. J. varieties that are grown, yet its one outstanding characteristic—early maturity—makes it indispensable for the present. Until a more suitable variety is found it will be advantageous to plant a certain acreage of it each year. The harvest season in Louisiana is very short, and any means of lengthening it would be worth consideration. In most years P. O. J. 234 can be milled at a profit two or three weeks earlier than P. O. J. 213. Enough P. O. J. 234 should be planted each year to afford sufficient stubble cane for milling during the first few weeks of the campaign. The P. O. J. 234 plant cane should be harvested as late as possible, in order to preserve the stubbles. Deterioration tests show that P. O. J. 234 is resistant to cold and maintains its sucrose content at a higher level than the other varieties. When all factors are considered, two weeks of grinding in the fall are worth more than a month's grinding after January 1. The addition of two weeks' grinding on the P. O. J. 234 stubble crop at the beginning of the season will more than compensate for the greater yields of the other varieties which do not reach their highest sucrose content until later in the season.

GENERAL CONSIDERATIONS

Prior to windrowing, during the first three or four weeks of grinding, a survey of all of the cane in the fields should be made, in order to determine its maturity. The chemical analyses made at this time will be of value during harvest and will serve as guides when the time comes to windrow. Only the more mature cane, as indicated by its appearance and high sucrose analysis, should be windrowed. After the first severe freeze a portion of the cane should be windrowed as an insurance against future weather conditions. Under ordinary conditions there is no urgent need for windrowing when the quantity of cane standing in the fields can be milled within three weeks from the date of the freeze. Cane in excess of the quantity that can be milled in this period should be windrowed immediately.

The plan of harvest will vary from plantation to plantation, depending upon the quantity of cane to be ground, the capacity of the mill, and to a certain extent the location. Plantations that are protected by large bodies of water, as are most of those in St. Mary Parish, will not have as much risk from cold weather as the plantations in almost every other part of the State. The weather conditions preceding and during the harvest and the maturity of the cane will be the other determining factors.

The length of time the cane will keep after a freeze depends upon the weather immediately preceding and following the freeze, the minimum temperature and its duration, and the maturity of the cane. Perhaps the type of soil is also an influencing factor. If the cold weather is preceded by rain the duration of freezing temperature may be short, but if there is dry weather prior to the freeze the duration of minimum temperatures is usually much longer.

The results from all of the experiments on standing and windrowed cane show that the P. O. J. varieties 36, 36–M, 213, and 234 should not be windrowed until there has been a freeze severe enough to kill the growing point and most of the leaves. The cane windrowed after the first light freeze during the early part of the season usually deteriorates very rapidly. When the temperature does not go below 30° F., cane should not be windrowed, because the losses from the deterioration of the sucrose content of the cane will be large.

After a freeze of 26° or 27° F., if the duration of the low temperature is long enough to kill the growing point and most of the leaves, the cane may be windrowed, and it will usually keep in good condition for about six weeks.

Immediately following a freeze of 27° F. or lower, the cane in each field should be thoroughly examined. It should be examined at the edge of the cut, along the ditch bank, and toward the center of the cut. If on being split lengthwise from top to bottom the cane has a water-soaked appearance throughout, with no clear tissue whatever, it is probable that it will not keep very long. A good part of it, however, should be windrowed, and if it clears up in three or four days it may keep in the windrow for three or four weeks. If it does not clear up it may not keep any longer than the standing cane. If the cane is only partly water-soaked, at the tip or along the rind, it will probably keep three weeks standing, and if it clears up in three or four days after windrowing it may keep five or six weeks in the windrow.

P. O. J. 36 is more resistant to cold than P. O. J. 213 and should be left standing. Not only is P. O. J. 234 as resistant as P. O. J. 36, but it actually maintains its sucrose content better than P. O. J. 36, and therefore the plant cane may be left standing until late in the season. Weather conditions and the quantity of cane to be milled will determine whether it is to be windrowed or left standing. As explained on page 25, it is best to harvest P. O. J. 234 stubble cane early in the season.

SUMMARY

Cane windrowed after a light frost usually deteriorates very rapidly.

After a freeze severe enough to kill the growing point and most of the leaves, the standing cane will keep about three weeks, and the cane windrowed immediately after the freeze will keep about six weeks.

Standing cane of P. O. J. 213 will not keep as long as the standing cane of P. O. J. 234 and 36.

P. O. J. 213 and 234 keep better in the windrow than P. O. J. 36.

Because of its early comparatively high sucrose content, enough P. O. J. 234 should be planted each year to furnish stubble cane for the early part of the season. The P. O. J. 234 plant cane should be cut late in the season in order to assure a good stand of stubble cane for the following harvest.

Cane cut for the mill early in the season deteriorates in about four days. After the cane has been frosted and is more nearly mature the rate of deterioration is much slower. There may be no deterioration for 8 or 10 days after cutting.

Under similar conditions unburned and burned cane deteriorate at about the same rate.

After the cane is cut for the mill the average daily loss of weight, throughout the harvest season, due to the evaporation of water, is about 1.08 per cent.

The deterioration of the stubble of early cut cane is due to the exhaustion of the food reserve of the rhizomes.

There is little or no advantage gained by shaving the stubble of the P. O. J. varieties of cane in Louisiana.

The freezing of the cane does not affect the subsequent growth of the stubble in Louisiana.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

OCTOBER 25, 1929

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